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A Planning Framework for the Bear Canyon Lake Area
Chevelon Ranger District
Apache-Sitgreaves National Forests

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ABSTRACT

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TITLE: A Planning Framework for Bear Canyon Lake

ABSTRACT: Management concerns arising from increased recreational use of the Bear Canyon Lake area suggests some type of management is needed to maintain the experience and setting. This study explores planning framework ideas and concepts for the lake area using a modified Limits of Acceptable Change model. The Recreation Opportunity Spectrum is used to compare Bear Canyon Lake's recreation experience with other near-by lakes.

Keywords: Planning Framework, Carrying Capacity, Customer Satisfaction, Recreation Experience, Limits of Acceptable Change.

EXECUTIVE SUMMARY

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Summary: Arizona has become the nation's fourth most popular state for forest recreation with 17 million recreation visitor days recorded in 1990. The Forest Service estimates the number of recreation visits to the Mogollon Rim on the Chevelon Ranger District has increased by at least 4% per year during the last 20 years. In the near future, this trend will likely continue or accelerate due to the proximity of a growing desert population and the continual improvement of the road system leading to the Rim.

Nestled in the southern portion of the District is Bear Canyon Lake, offering Arizona residents scenic attractions, relief from desert heat, and scarce water-based recreation. This lake is one of the last remaining on the Mogollon Rim offering easy access and little or no development. Dramatic increases in use during the 1980s led to physical impacts such as trash, human waste, fire scars, vegetation damage, soil disturbance and compaction, site modification, rutting, and loss of wildlife habitat effectiveness. These impacts raised concerns that visual qualities and the recreation experience were being diminished.

These concerns led resource managers on the Chevelon Ranger District to propose intensive recreation management of the Bear Canyon Lake area. The Apache-Sitgreaves National Forest Land Management Plan proposed improving the road system leading to Bear Canyon Lake and constructing a campground at the lake to manage and regulate use and accommodate the perceived need for more developed camping.

An environmental analysis was begun on these proposals in May of 1991. During the summers of 1991 and 1992, visitors to the area were surveyed about the proposals. In September 1993, the District will complete the environmental analysis that will determine the standard of the road system leading to Bear Canyon Lake and how the lake area is managed and what, if any, recreation improvements will be constructed.

This study uses a Limits of Acceptable Change (LAC) model (Stankey and McCool 1984; Stankey et al. 1985) modified by Manning (1985) and is designed to integrate with the environmental analysis. Reliance is made on the Recreation Opportunity Spectrum (ROS) for comparison of Bear Canyon Lake

with other nearby water-based attractions. This study has the following objectives:

(1) Provide pertinent information to the Interdisciplinary Team for use in the proposed Bear Canyon Lake Campground Environmental Analysis.
(2) Use management objectives and public comments to determine the desired recreation experience to provide, the appropriate level of use for the desired experience, and in what geographic mix (east side of the lake vs. west side of lake vs. south side of lake).

Three management concepts are developed and include:

(1) Continuance of the present management system,
(2) Designate, using individual campsite signs, where people may dispersed camp.
(3) Construct a campground on one side of the lake, and designate dispersed campsites on the other 2 sides.

The management concepts are evaluated based on their impacts to the physical, social, and managerial environment at the lake, and their contribution to recreation experiences in a 5 lake study area.

This analysis selects management concept 3 because it best protects or enhances the resource, social, and managerial values at the lake.

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1.0 INTRODUCTION

Arizona has become the nation's fourth most popular state for forest recreation with 17 million recreation visitor days recorded in 1990. The Forest Service estimates the number of recreation visits to the Mogollon Rim on the Chevelon Ranger District has increased by at least 4% per year during the last 20 years. In the near future, this trend will likely continue or accelerate due to the proximity of a growing desert population and the continual improvement of the road system leading to the Rim (Figure 1).

Nestled in the southern portion of the District is Bear Canyon Lake, offering Arizona residents scenic attractions, relief from desert heat, and scarce water-based recreation. This lake is one of the last remaining on the Mogollon Rim offering easy access and little or no development. Dramatic increases in use during the 1980s led to physical impacts such as trash, human waste, fire scars, vegetation damage, soil disturbance and compaction, site modification, rutting, and loss of wildlife habitat effectiveness. These impacts raised concerns that visual qualities and the recreation experience were being diminished.

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An environmental analysis was begun on these proposals in May of 1991. During the summers of 1991 and 1992, visitors to the area were surveyed about the proposals. In September 1993, the District will complete the environmental analysis that will determine the standard of the road system leading to Bear Canyon Lake and how the lake area is managed and what, if any, recreation improvements will be constructed at the lake.

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2.0 STUDY OBJECTIVES

(1) Provide pertinent information to the Interdisciplinary Team for use in the proposed Bear Canyon Lake Campground Environmental Analysis, and
(2) Use management objectives and public comments to determine the desired recreation experience to provide, the appropriate level of use for the desired experience, and in what geographic mix (east side of the lake vs. west side of lake vs. south side of lake).

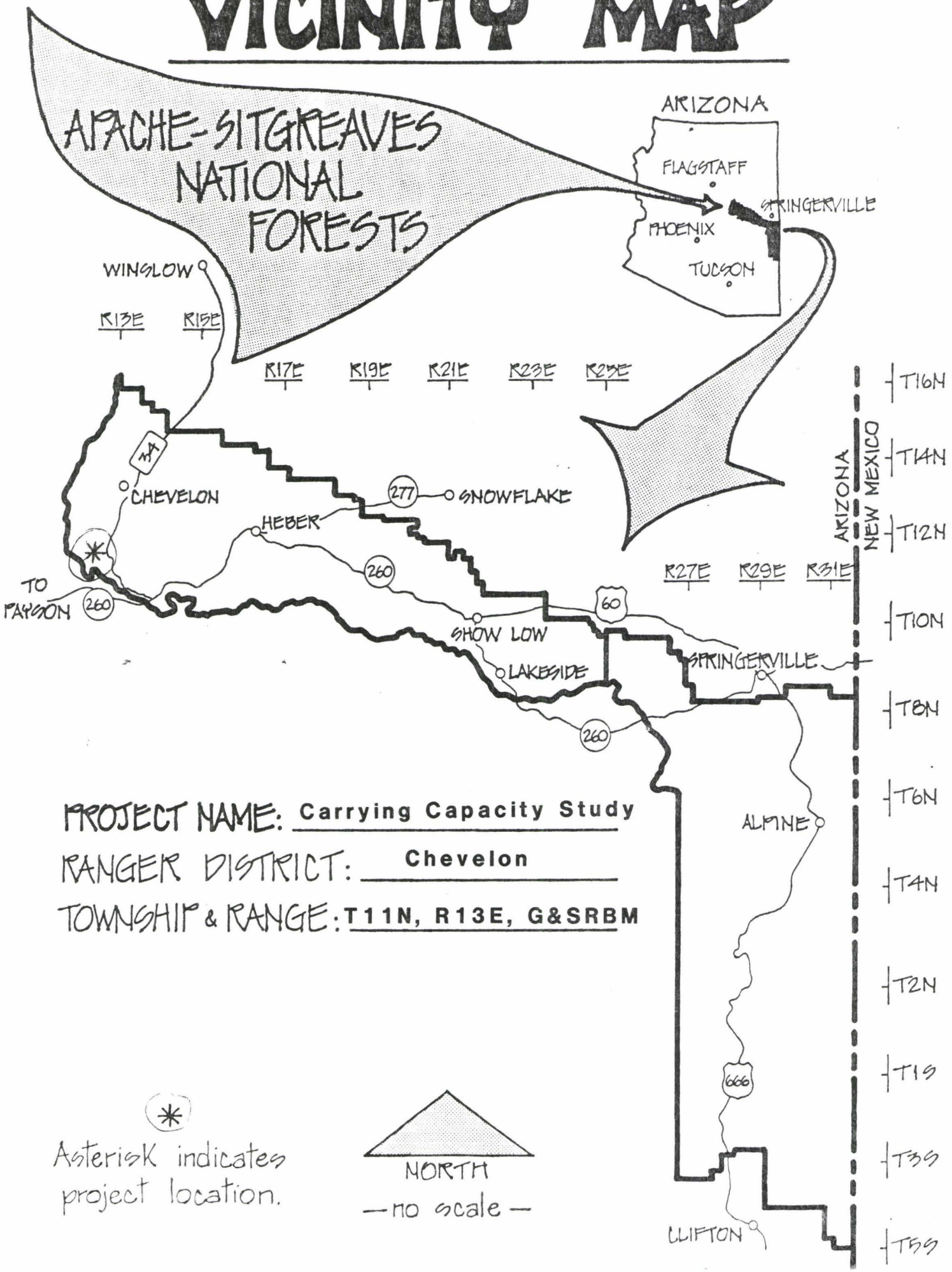
3.0 CARRYING CAPACITY FRAMEWORK

Rapidly expanding recreation patterns in the 1950s and 1960s caused recreation researchers to consider the long-established wildlife and range management concept of carrying capacity (Dasmann 1964). Wager (1964) suggested that increasing numbers of visitors affect the quality of the recreation experience and impact the physical resources of an area.

Recreation use impacts include both physical and social effects. Physical

Figure 1.

VICINITY MAP



PROJECT NAME: **Carrying Capacity Study**

RANGER DISTRICT: **Chevelon**

TOWNSHIP & RANGE: **T11N, R13E, G&SRBM**

* Asterisk indicates project location.

impacts include erosion, loss of vegetation, or water pollution caused by trampling, campsite location, or livestock use (Hammitt and Cole 1987, Cole 1989). Many ecological impact studies show that most of the impact to a site is caused under fairly low use levels within the first few uses (Cole 1981). Use intensity is often less important in explaining impact than user behavior, season of use or fragility of the resource (Cole 1981; Kuss 1986).

The traditional recreation carrying capacity concept implies an incorrect cause and effect relationship between the amount of use a site receives and subsequent impact. Managing to restrict numbers of users to prevent physical impacts would require extremely low visitation levels, which wouldn't be acceptable to the public.

Social impacts include such things as conflict among visitors or perceptions of crowding (Gramman 1982, Graefe et al. 1984, Shelby et al. 1989). These impacts have various effects on visitor satisfaction depending on the needs and motivations sought. As demand for outdoor recreation continues to increase, both physical and social impacts will continue to occur.

Management activities affects upon carrying capacity first received consideration by Wager (1968). He expanded the carrying capacity concept beyond environmental and social concerns to include a management component that was appropriate in situations where the quality of recreation experiences might be enhanced by management actions. For example, redistributing visitors to lesser used areas or educating visitors to encourage more desirable visitor behavior.

There is no magic number for the capacity of a given recreation site. Deciding how much and what kind of use is acceptable for an area must be based on managerial judgement and experience (Driver, phone call, 1993. Lee, 1992). The three interrelationships of (1) management objectives, (2) recreation user (social) attitudes, and (3) impacts of recreation use on natural resources are all important in determining carrying capacity (e.g., Wagar 1964, Lime and Stankey 1971).

The social component of the carrying capacity equation is often difficult to assess because it deals with impacts on the recreation experience. Social carrying capacity is based on human values and attitudes which cannot be directly manipulated by managers.

Sociological studies have also questioned the credibility of managing the number of people. Although many of the early studies of perceptions of crowding in wilderness areas revealed preferences for low numbers of encounters and greater affinity towards solitude (Shelby 1981), more recent studies remind us that recreation lands are used by many people, seeking varied and often conflicting recreation experiences (Hammitt 1988). What may be acceptable people encounter levels for one person, may be considered too high for another.

The ROS and LAC models evolved from the traditional model of carrying capacity due to concerns about the value of focusing management on regulating user numbers, which may have little to do with controlling impacts.

4.0 RECREATION OPPORTUNITY SPECTRUM FRAMEWORK

The ROS system is a conceptual framework for encouraging diversity in outdoor recreation opportunities. The ROS was developed simultaneously by two groups of researchers: Clark and Stankey (1979) and Brown, Driver, and associates (1978, 1979).

The ROS provides a systematic means to inventory wildland units in terms of recreation opportunity settings, gives a framework for defining management actions appropriate to recreation objectives, and permits the monitoring of impacts of management over time. The ROS is based on the idea that recreators' pursuits of certain activities in particular settings is a revelation of their demand for experiences that are satisfying and that may give long-term benefits.

The ROS model presents a spectrum of experience opportunity classes that relate a range of desirable recreation experiences to an array of possible wildland settings and activities. A key advantage of the model is the flexibility it allows in the structure of opportunity settings. Setting structure is composed of three components: (1) an ecological component (consisting of biological and physical factors), (2) a social component (the number of people in the setting at one time and their kinds of social interactions), and (3) a managerial component (kinds of facilities provided and the degree of regulation of recreators).

One important use of the ROS regards the assessment of impacts. The ROS framework provides a simple means of identifying the consequences of management actions. Physical and biological alterations of resources can be systematically analyzed in terms of changes in recreation settings which affect recreation experience opportunities (Richards and Daniel 1991).

The ROS framework is used in this study to compare recreation opportunities, and therefore recreation experiences, at lakes within the Bear Canyon Lake study area.

5.0 LIMITS OF ACCEPTABLE CHANGE FRAMEWORK

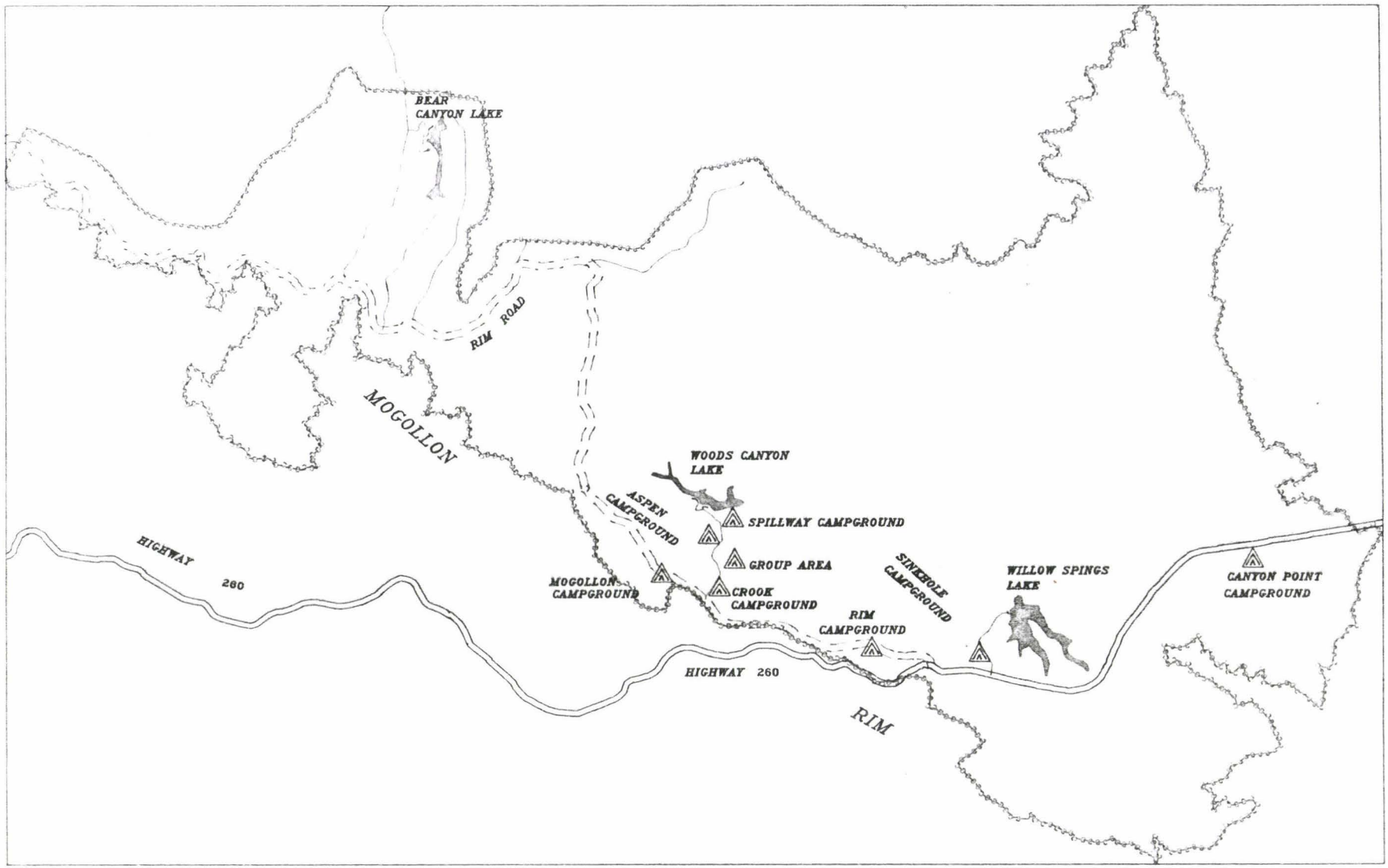
The LAC System proposed by Stankey and others (1985), provides an alternative way of looking at carrying capacity. LAC incorporates natural resource, socio-political and managerial factors and works by identifying desired resource conditions and formulating management action alternatives to achieve these conditions. Management attention shifts from defining maximum use levels to "identifying desired conditions and managing use levels and/or other management parameters so that impacts do not exceed these conditions" (Hendee et al. 1990).

This study employs a modified LAC process to develop and evaluate several management concepts for the Bear Canyon Lake area.

6.0 BEAR CANYON LAKE HISTORY

Bear Canyon Lake is the most remote attraction in the Rim Lakes Management Area (RLMA) (Figure 2). The dam was completed in 1964 by the Arizona Game and Fish Department under special use permit with the United States Forest Service to create a "fishery and forest recreation impoundment" (Forest Service Multiple Use Impact Survey, Sitgreaves National Forest 1964). The Department wanted to create a recreation destination for Arizona's rapidly growing population. At the time of development, access to this part of the Mogollon Rim was from the north. The average user came from Winslow or Holbrook, small communities within a couple of hours drive. Travel from the south was limited by the poor condition of the roads. A trip from the Phoenix Metropolitan area was an all day affair.

FIGURE 2. RIM LAKES MANAGEMENT AREA



The last 15 years has brought many changes to the Rim. Arizona Department of Transportation (ADOT) completed vast improvements to the road system from the Phoenix Metropolitan Area to the Rim. The drive now takes only two hours. The road system on the Sitgreaves National Forest received vast improvements during the "glory days" of timber harvesting when, for many years, the Chevelon Ranger District harvested 30 to 60 million board feet of timber. Bear Canyon Lake now has good gravelled road access on its east, west, and south sides.

The traditional camp area, which is on the west side of the lake is easily accessible by small cars. Most visitors don't make the hike to the lake which is at the end of a 1/4 mile trail down a steep canyon side. Average summer weekends find 300 to 400 people camped in this 20-acre area. Average weekend use on the south side of the lake is 80 people (120 people were noted once) camped in a five-acre area. Typical weekends on the east side of the lake finds 50 people camped along two miles of road.

Years of heavy unregulated use has caused concerns about degradation of resource capability and the camping experience. Many campers and anglers who have witnessed this increase claim the quality of the fishing and camping experience has deteriorated. Many "old timers" visit the lake during the week hoping to avoid the weekend crowds. Some of them now camp away from the traditional camp area, often using the east side of the lake, hoping to find solitude there. Several years ago, during a holiday weekend, the District Law Enforcement Officer estimated 1,000 people camped on the west side of Bear Canyon Lake in the traditional camp area.

The tremendous increases in recreational use and the associated impacts to the State in general, and the rim area in particular, have not gone unnoticed by the State of Arizona or the Forest Service. In 1986, the Arizona Governor's Task Force on Recreation on Federal Lands suggested the Bear Canyon Lake portion of the Rim be designated a National Recreation Area by Congress because of the area's popularity.

In 1987, the Apache-Sitgreaves National Forests completed an environmental analysis which created the RLMA. The RLMA designation places a recreation and wildlife emphasize on the area. Maintenance of foreground Visual Quality Objectives, reestablishment of ground vegetation to areas denuded by heavy recreation use, maintenance of a broad spectrum of recreation opportunities, and maintenance of big game habitat effectiveness were important objectives of the designation. This RLMA analysis also suggested a campground at Bear Canyon Lake but did not complete the analysis for the suggestion.

After the area received the RLMA designation, regulation of unregulated camping and forest visitation began. Near Woods Canyon Lake, designation of dispersed campsites limited the available sites in this heavily used area. This management action displaced campers and forest visitors to the western part of the RLMA where Bear Canyon Lake is. A new group of forest visitors began "discovering" the Bear Canyon Lake area.

The Apache-Sitgreaves National Forest Land Management Plan proposed improving the road system leading into Bear Canyon Lake and constructing a campground at the lake to manage and regulate use and accommodate the Rim's perceived need for more developed camping.

7.0 RECREATION OPPORTUNITY SPECTRUM INVENTORY OF THE STUDY AREA

State Highway 260 enters the RLMA as it crests the Mogollon Rim at Al

Fulton Point (Figure 3). One mile to the east of Al Fulton Point is Willow Springs Lake. It offers paved access and a boat dock. Little or no walking is needed to get to the shoreline. One half mile from the lake is a 26 site fee campground. This lake is considered a prime location for a highly developed campground which, if constructed, would probably raise the current ROS classification of Rural to Urban, depending upon design and construction techniques (Table 1). The lake and existing 26 site campground receives heavy weekend and moderate weekday use during the recreation season.

Woods Canyon Lake is three paved miles to the west of Al Fulton Point. It is the most heavily developed lake in the RLMA with an ROS classification of Urban. This lake boasts a store, 214 fee campsites in four different campgrounds, two group camping areas, a boat dock, and easy access to the shore. The campsites are filled to capacity on weekends throughout the summer recreation season. Weekday use averages 60% capacity. The lakeshore is lined with people on weekends and use drops off during the week. Additional campsites have been proposed in the area and are currently being analyzed in an environmental analysis. It is expected the decision will not opt to add new sites.

Located 16 miles to the north of Al Fulton Point, outside the RLMA, is Chevelon Canyon Lake. This lake, while outside the RLMA, is a nearby water-based attraction which is within the Bear Canyon Lake study area. Chevelon Lake is in the bottom of a steep deep canyon. A primitive no-fee campground is located at the end of a badly rutted road on a ridge above the lake. The District has no plans for improvements at this campground. As time and money allow, the trails leading to the lake are being maintained at a primitive level. The lake's ROS classification is semi-primitive non-motorized.

Knoll Lake is located 18 miles west of Al Fulton Point on the Coconino National Forest and is outside the RLMA. Knoll Lake has a boat dock and a 33 unit fee campground with plans to expand to 50 campsites. The lake and campground receive heavy use on weekends and light use during the week. Walking access to the shore is more difficult than Woods Canyon Lake or Willow Springs Lake, though much easier than Chevelon Canyon Lake. The ROS classification is rural. The proposed expansion of the campground will not change the ROS classification.

Bear Canyon Lake is located 12 miles to the west of Al Fulton Point. There are two chemical toilets in the traditional camp area and a vault toilet at each parking lot at the two trailheads on the western part of the lake. Due to terrain, the lake has three distinct geographic areas, each with their own access and each offering its own unique experience to forest visitors.

The east side of lake was logged three years ago. Little consideration was given in sale design and fuels treatments to the physical and visual impacts of the treatments to the ever increasing recreational use of the area. The areas prized by campers were logged during the sale. Accumulations of slash caused campers to displace to other areas of the forest or move to the south side or west side of the lake. Very few people now use this area, although as the logging slash has begun to decompose, use has been on the upswing.

Figure 3. ROS Inventory Lakes

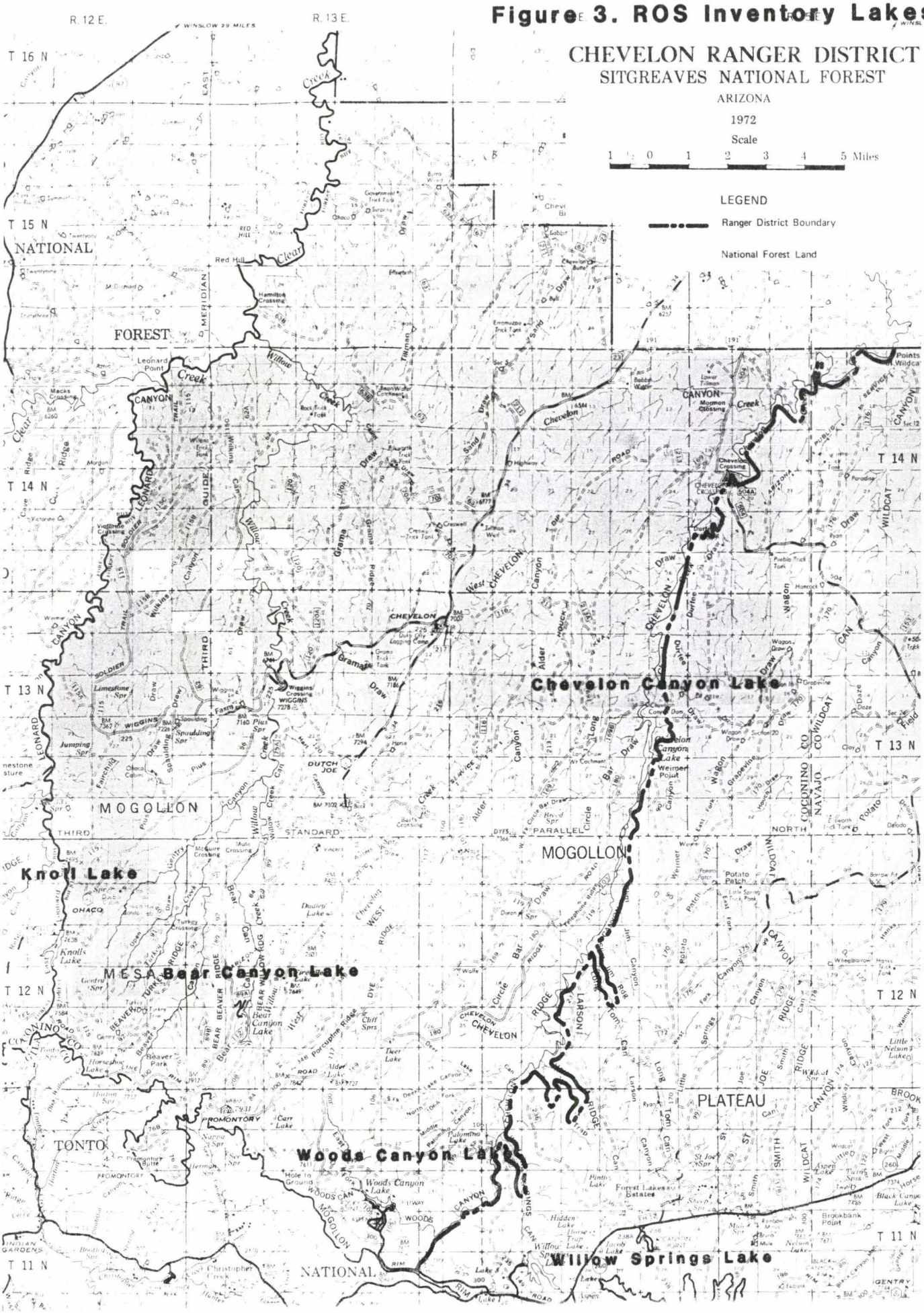


Table 1. The current ROS classification for the Bear Canyon Lake study area on heavy use weekend days.

Lake	ROS Classification
Willow Springs ...	Rural (R)
Woods Canyon	Urban (U)
Chevelon Canyon ..	Semi-Primitive Non-Motorized (SPNM)
Knoll	Rural (R)
Bear Canyon	Rural-west and south side (R), Roaded Natural-east side (RN)

8.0 PUBLIC COMMENTS

During the summer of 1991 and 1992 over two thousand people were contacted in a random survey by mailings, or face-to-face encounters, and provided with information about the environmental analysis for a proposed campground at Bear Canyon Lake and proposed improvement to the road system leading to the lake area. The people contacted were invited to participate in the environmental analysis by commenting. An aggressive effort was made in the Bear Canyon Lake area to contact as many people as was reasonably possible and discuss the analysis. Informational meetings were held 3 times in Phoenix, twice in Winslow, once in Payson, Forest Lakes, and Blue Ridge. Seventy seven comment sheets were returned to the District (Appendix B). Some key phrases have been taken from the returned comment sheets which capture public wants, needs, and desires in the Bear Canyon Lake area and include:

--"keep in present condition"
--"I appreciate the quiet undisturbed setting of the lake"
--"don't destroy scenic attractiveness of area"
--"maintain pristine feel"
--"Develop campground where people want to camp"
--"leave as is"
--"want privacy-quiet"
--"shudder to see Bear Canyon too developed"
--"Why impact a pristine area?
--"control camping, bring recreation area back to it's original form"
--"retain as primitive lake"
--"campground that is not too developed and campsites not too crowded together."

9.0 MANAGEMENT PLANNING PROCESS

Various methods which would fulfill this study's objectives were considered and evaluated based on the following 4 guidelines:

(1) The methodology must be readily usable by Chevelon Ranger District recreation management and Interdisciplinary Team personnel.

(2) Time constraints imposed on this study made it impossible to develop a data base specifically for the calculation of carrying capacities. The methodology must be able to rely upon secondary analysis of existing information using reasoning credible and understandable to the public. The public has an increasing awareness and interest toward resource management issues at Bear Canyon Lake. It is apparent that the methodology used will be under intense scrutiny. If it is not logical and objective, it is unlikely that any recommendations based on this study will receive public support.

(3) Because carrying capacity is not considered to be a single, fixed value at Bear Canyon Lake, it is possible that a variety of alternative management directions can be proposed. The methodology used must be capable of describing the consequences of each proposed management alternative in such a manner that managers and citizens can readily detect how each differs from current (baseline) conditions. Being able to review alternative management proposals in this manner makes it possible to more easily weigh the trade-offs involved in the different concepts.

(4) The methodology must employ the ten basic principles of outdoor recreation described by Manning (1985). These principles are broad in scope and are drawn from findings recurring in outdoor recreation research. They provide the outdoor recreation manager a framework for considering management implications pertaining to the use of the outdoor setting (Appendix C).

The methodology selected for this study relies on a Limits of Acceptable Change Model outlined by Stankey and McCool 1984, Stankey et al. 1984 and 1985, and modified by Manning (1985). This model follows a logical and comprehensive process by which rational and defensible management approaches can be formulated, it explains the consequences of alternative management decisions, and it incorporates Manning's (1985) 10 basic principles of outdoor recreation management.

Manning's method (1985) employs four steps to formulate a management strategy: (1) begin by inventorying current Bear Canyon Lake area conditions; (2) then determine the area's management objectives; (3) next, develop area management prescriptions; and (4) develop a monitoring plan for the area to ensure the management objectives achieve their goal.

9.1 Step 1. Inventory existing Bear Canyon Lake area conditions. Collecting baseline information begins the process.

9.1.1 Substep 1-A. Inventory and assess the physical/biological environment of the area. Pertinent questions and answers include:

1. Does the area contain unique or outstanding ecological, scientific, educational, historic, or cultural resources that warrant special management attention? The area contains a tremendous amount of ecological and associated biological diversity. The ridge tops offer easy access and Ponderosa pine/Gambel oak forests. Large north-south running canyons, such as Bear Canyon, have numerous small east-west running canyons draining into them. The canyons contain numerous mixed-conifer species. Several miles to the south of Bear Canyon Lake is the Mogollon Rim escarpment offering breathtaking views of the Tonto Basin area. A cultural resource survey found nothing of historic or pre-historic interest in the area.

2. Does the area contain critical habitat for threatened or endangered species? The canyons provide habitat for the Mexican Spotted owl which the US Fish and Wildlife Service has proposed for listing as a threatened species. Based on

existing information about known birds' location relative to the lake, and the implications of the listing to management direction, it is believed the owl will not have any impact on the Bear Canyon Lake area. The Forest Service considers the area suitable habitat for Goshawks (Forest Service sensitive) and Little Colorado Spinedace (threatened), though none are known to inhabit the area.

3. How fragile are the area's resources and what are the changes likely to occur as a result of recreational use? The flat, open-park like areas on the west and south sides of the lake have "taken a beating" from continual and concentrated recreational use. Forest visitors are able to drive wherever they want which compacts the soil. Due to this compaction, trees in the area are beginning to show a decline in health and vigor. Eventually, continued unregulated use will begin to kill not only grasses and forbs, but the forest itself, which is one of the area's primary visitor attractors. The Forest soils scientist and hydrologist have expressed concerns about soil loss and high concentrations of bacteria from human fecal matter in these areas. Bear Canyon Lake is the ultimate repository of soil movement. The east side of the lake has not, as of yet, received heavy recreational use. The east side of the lake's forest and soil types are the same as the west and south side of the lake and under heavy use would suffer the same impacts.

4. How natural are the area's resources? The south and east sides of the lake have been heavily logged at least once. The traditional camp area on the west side of the lake has not been logged, though the area around it received the same silvicultural treatments as the south and east sides. A 60 foot wide fire break was placed along the west side of the main access road (Forest Road 89) during the summer of 1990, when a large wildfire threatened the area.

9.1.2 Substep 1-B. Inventory and access the social environment of the Bear Canyon Lake Area. Pertinent questions and answers include:

1. What kinds of recreation does the area now support? Most visitors come for the magnificent scenery. Day users include anglers and folks driving for pleasure. Observations indicate that campers (tent, popup campers, RV, sleep-in-car) are the predominant users of the area. Most campers bring a lot of gear. Most people never make the somewhat difficult hike to the lake, though usually at least one member of each party will. The trail is steep, has a poor tread, and for most visitors the change in elevation between their point-of-origin and Bear Canyon

Lake (over 6,000 feet for desert dwellers, 3,000 feet for Winslowites) makes the trip back up the trail a difficult task. Most people are satisfied to look into the canyon to view a portion of the lake from a distance. The lake is for artificial bait only, is not productive, and is difficult to catch fish in. The fish typically caught is very small. The head of the lake does support a fisheries which attracts fly fishermen and women, though they are usually just day visitors to the lake. Most campers come in small multi-family groups or camp in close proximity to friends; an opportunity limited at other campgrounds in the study area due to few available group sites. Many of the folks desire a minimum amount of regulation and are willing to do without certain amenities and the cost associated with fee campgrounds. On weekends, campers who were not able to find a campsite in one of the study area's developed campgrounds camp here because of the toilets. Small and large groups of campers bring pack animals to the area, typically staying at the south side of the lake.

2. What are the recreation motivations of people attracted to the area? Many campers come in multi-family or some type of related (work, church, scout) groups. Some groups contain over 100 people, though most are 15 to 25 people. Most visitors told the surveyors they camped here to "get away from the crowds" or to enjoy the "primitive/pristine lake area." Usually Woods Canyon Lake was their descriptor of what they wanted to avoid. People fishing had the same story, they didn't like fishing with the crowds and again, as with the campers, they would typically mention Woods Canyon Lake as a place to be avoided. Fishing pressure on the lake is light in view of the heavy near-by camping pressure which is attributable to the difficult hike to the lake. Most of the same campers who said they wanted to avoid the crowds at Woods Canyon Lake were in the midst of far greater numbers of people on a per acre basis but didn't seem to mind or notice because they could configure their campsites to suit their social needs. Winslowites are more apt to visit the lake during the week, or use the east side of the lake during the weekend, to avoid the crowds. They seem to detest the crowds of desert dwellers who have "invaded their forest" and as such avoid heavy use areas.

3. What are the attitudes and preferences toward management policies, facilities, and services? Many visitors are attracted to the area for its lack of regulation. Visitors unable to book a spot at any of the developed campgrounds in the study area have come to the west side of the lake because of the public toilet facilities and to be near other campers. Many campers are attracted to the west side

of the lake during the summer when fire restrictions are in effect because this is one of the few areas where campfires are allowed.

4. What are the socio-economic and cultural characteristics of the people attracted to the area? The survey was not designed to address this because of the difficulty in gaining Office of Management and Budget approval for questionnaires.

9.1.3 Substep 1-C. Inventory and assess the management environment of the Bear Canyon Lake area. Pertinent questions and answers include:

1. What management practices are currently applied to the area? District recreation maintenance people clean the area 2 times per week and pick up any garbage left on the ground by visitors. They also remove ashes from rock firerings which campers seem to enjoy constructing. The Forest Service patrols the area regularly, though not at night, and the interpretive specialist gives a presentation every Saturday night, using a portable generator to provided electricity. Attendance at the presentations is very good. During the weekend the Arizona Game and Fish Department patrols the lake shore.

2. What management dictates apply to the Bear Canyon Lake area? Bear Canyon Lake is within the RLMA. The management focus in the RLMA is on recreation and wildlife habitat. Emphasis is placed on maintenance of visual qualities, reestablishment of ground vegetation to areas denuded by heavy recreation use, maintenance of a broad spectrum of recreation opportunities, and maintaining big game habitat effectiveness. Dollar constraints have meant that higher priority areas have received more intensive management emphasis while the Bear Canyon Lake area has received little.

3. What personnel and financial resources are available for the area management? Money and people are available to maintain the present operation and maintenance (O&M) levels. More intensive O&M is possible, though not at all areas of the lake due to the cost involved. The Chevelon Ranger District does not anticipate increases in coming years' O&M budget. America's Great Outdoors Initiative promises continued support under the country's new administration to provide additional funds for campground development. If a campground is constructed it must be able to support a concessionaire operation. The Chevelon District would not be able to manage the campground due to limited O&M dollars.

9.2 Step 2. Determine management objective (desired conditions) for the Bear Canyon Lake area. Quantifiable objectives, incorporating public involvement and considered value judgements, are developed starting with the baseline data collected in Step 1. Public preferences will be accommodated to the extent possible, given natural resource and management condition constraints.

9.2.1 Substep 2-A. Develop alternative management concepts. The three factors in outdoor recreation (the natural environment, social conditions, and the type of management applied) can be combined in widely ranging configurations. Broad management directions need to be established for each of the three basic factors. The concepts will be limited to those few which reflect the most realistic and reasonable alternatives compatible with environmental, social, and managerial conditions. The concepts include:

Management Concept 1 (No change) - No change in Bear Canyon Lake area management. This concept serves as a baseline for comparing other concepts.

Management Concept 2 (Designated dispersed) - This concept involves regulation of visitors on the 3 sides of the lake and has been employed with great success in the central and eastern portion of the RLMA outside of the developed camping areas. "Designated dispersed" as it is called works by delineating specific sites with numbered signs where people may camp. Small signs located along RLMA roads direct campers to the sites. The sites are located in the forest within 300 feet of the roads. This program allows tremendous management flexibility. The campsite locations are chosen based on historical use patterns, terrain, vegetation, and access, and are signed far enough apart to eliminate crowding. When a site becomes damaged it is taken out of the system and rested until it is revegetated. Depending upon the availability of other possible sites, the eliminated site may or may not be placed somewhere else. The public has given this system high marks. Motor vehicles will be required to stay in designated areas.

Management Concept 3 (Campground/Designated dispersed) - Bear Canyon Lake's 3 distinct areas offers the possibility of offering more than 1 concept for the public and still manage for homogeneous uses. A combination of Concept 2 and a campground is possible. It is felt that numerous opportunities to partake of Concept 1 (unregulated camping) exist outside the RLMA and across much of the Mogollon Rim. Therefore, only Concept 2 and a campground have been included in Concept 3.

9.2.2 Substep 2-B. Select the best management concept. This involves systematic evaluation of the alternative concepts by examining and describing the effects of each. Public involvement is essential throughout this process. Interested members of the public should be informed of the management concepts under consideration and have an opportunity to comment on them. When this study is complete, the public will have numerous opportunities to comment on the suggested alternative management concepts. The public scrutiny of these concepts may produce new concepts for consideration, or combinations, or modifications of the original concepts. Based on past analyses there will probably be little or no consensus among the public which is all the more reason to provide diversity in outdoor recreation opportunities. The 3 alternative management concepts are evaluated against the following four questions:

1. What is the contribution of each concept to the diversity of recreation opportunities (ROS) in the Bear Canyon Lake study area?

Concept 1 (No change) - This concept contributes to study area's diversity assuming the current ROS classes are maintained (Table 2). While three of the study area's lakes are classified as rural, because of the volume of visitors, development scales vary enough to establish a difference in actual settings between these lakes (Elam 1993).

Concept 2 (Designated dispersed) - This concept contributes to the study area's diversity assuming Bear Canyon Lake's west side changes from rural to roaded natural ROS.

Concept 3 (Campground/Designated dispersed) - This concept contributes to the study area's diversity assuming Bear Canyon Lake area's mix of ROS classes.

Table 2. Management concepts contribution to ROS diversity in study area.

Lake	ROS Classification		
	Concept 1	Concept 2	Concept 3
Chevelon Canyon	SPNM	SPNM	SPNM
Willow Springs	R	R	R
Woods Canyon	U	U	U
Knoll	R	R	R
Bear Canyon-west	R	RN	R/U
-south	R	RN	RN
-east	RN	RN	RN

2. What are the potential effects of each concept on visitor use of the Bear Canyon Lake area?

Concept 1 (No change) - Visitor use will continue to increase dramatically. Fueling this increase is ADOT and the Forest Service's improvements to the road system leading from the ever growing Phoenix Metropolitan area to the study area. According to an Arizona State Parks Department survey (1992), demand is high for outdoor recreation at areas such as Bear Canyon Lake.

Concept 2 (Designated dispersed) - The number of campsites available will be limited. As a result, camping use will stabilize at a number much less than the current. Displaced campers will move to the north and camp in the forest where there is no regulation, move to the west onto the Coconino National Forest, or seek recreation in another part of the State.

Concept 3 (Campground/Designated dispersed) - In the designated dispersed area, the effects are the same as in Concept 2. In the campground area, the short term effects are that it might attract more people and take some camping pressure off Knoll Lake. In the long term, the use will stabilize due to a limited number of sites. Displaced campers will move to the north and camp in the forest where there is no regulation, move to the west onto the Coconino National Forest, or seek recreation in another part of the State.

3. What are the social and natural resource values in the Bear Canyon Lake study area which are enhanced or diminished by each concept?

Concept 1 (No change) - If this concept were implemented the effects would be:

1. Social values diminished - The area will receive increased visitations resulting in management being unable to maintain a natural look to the area. Due to lack of toilets the area's bad "smell" will continue. Conflicts between users typically arise due to non-homogeneous nature of campers in the same small area. This phenomenon will increase due to increasing visitation.
2. Social values enhanced - In the public's mind, primitive camping will be maintained and the area will not become "too developed."
3. Natural resource values diminished - The area's soils will continue to be compacted resulting in a reduction in the forest's health and vigor, continued erosion into Bear Canyon Lake, and management will not be able to

keep the area in its present "pristine condition." Fecal coliform levels will rise and continue to be a concern.

4. Natural resource values enhanced - None are known.

Concept 2 (Designated dispersed) - If this concept were implemented the effects would be:

1. Social values diminished - In the public's mind there will begin to be a modicum of regulation including more signs and more of a Forest Service presence. Motor vehicles will be required to stay in designated areas.
2. Social values enhanced - This concept maintains "primitive" camping opportunities. The area will not become "too developed", though additional toilets would be added to the area.
3. Natural resource values diminished - There will be some compaction of soils, reduction in forests health and vigor, and erosion in areas where visitors can go.
4. Natural resource values enhanced - Soil compaction can be prevented or controlled and areas needing rest can receive it. It would be possible to maintain or improve present forest condition. Unneeded roads will be closed or obliterated, and revegetated.

Concept 3 (Campground/Designated dispersed) - If this concept were implemented the effects would be:

1. Social values diminished - There will be higher levels of regulation including signs and more Forest Service presence. Accessibility will be limited due to closing of unneeded roads. Motor vehicles will be required to stay in designated areas.
2. Social values enhanced - This concept maintains a diversity of recreation opportunities in the Bear Canyon Lake area (Table 2). It will be possible to manage for homogeneous uses, thus minimizing the conflicts between different types of visitors. A garbage pickup service would be provided.
3. Natural resource values diminished - There may be a need for additional roads, though they could be placed on already compacted areas. Compaction will occur where the visitors frequent with the resultant reduction in forest health and vigor.
4. Natural resource values enhanced - Areas outside the campground and designated dispersed sites can receive rest when needed. Compaction and erosion can be managed. It will be possible to maintain or improve the present forest condition in these areas. Unneeded roads will be closed or obliterated, and revegetated.

4. What is the management feasibility of accomplishing each concept in the Bear Canyon Lake area?

Concept 1 (No changes) - This concept is economically feasible and in the short term is politically feasible.

Concept 2 (Designated dispersed) - This concept is probably implementable in FY94 based on recent budget trends. The west side of the lake would need vast amounts of managerial time to regulate because of the historical use pattern of unregulated camping. The south and east side of the lake would be easy to manage due to the 2 areas' smaller sizes and camper use patterns.

Concept 3 (Campground/Designated dispersed) - Campground construction requires a large outlay of capital. Funds could be available as early as 1997. With a concessionaire operation, there would be minimal operation or maintenance cost for the District. The designated dispersed concept is probably possible next year.

Table 3. Decision Matrix. Numerical evaluation of alternative management concepts developed in Substep 2-B.

	The 4 Questions					
	1	2	3		4	
			Social	Natural Resource		Totals
Concept 1	+1	+1	0	-1	+1	+2
Concept 2	+1	-1	+1	+1	+1	+3
Concept 3	+1	+1	+1	+1	+1	+5

Note: Numerical rating based on: +1 equals plus/positive/more, 0 equals no change, and -1 equals minus/negative/less.

9.2.3 Decision. Based on this analysis of the natural, social, and managerial environment Concept 3 is recommended. Specific management objectives will be developed for this concept in Substep 2-C. Concept 3 was selected because:

1. It best serves the needs of visitors seeking diverse recreation opportunities in the Bear Canyon Lake area and the study area.
2. It maintains a variety of social opportunities, including the current, in the Bear Canyon Lake area.
3. It minimizes adverse resource impacts in the area.
4. It minimizes displacement of campers to other areas.
5. It provides homogeneous management of the lake's 3 different areas.
6. It best serves managements needs.

9.2.4 Substep 2-C. Develop specific management objectives for the Bear Canyon Lake area using Concept 3. The specific prescriptions developed below will guide day-to-day

management activities at Bear Canyon Lake and will eventually be used to evaluate success. The specific management objectives include:

1. Build campground which concessionaire operator can manage.
2. Design and construct campground so camper has perception of naturalness and opportunity to fulfill selected motivations such as closeness to nature and socialization among multi-family groups.
3. Construct appropriate number of toilets.
4. Manage for a natural forested appearance at all areas around the Lake.
5. Where able, enhance area's visual qualities through appropriate vegetative management techniques.
6. Favor indirect management practices over direct practices.
7. Minimize campsite and trail erosion into lake (protect lake's water quality), and
8. Protect and maintain ground cover and hiding cover in Lake area.

9.3 Step 3. Develop management prescriptions for the Bear Canyon Lake area. What level and type of management actions can be, and need to be, applied to the Bear Canyon Lake area to move from the current to the desired condition? The final answer to this question will be in the Campground environmental analysis and design narrative for the Lake.

9.3.1 Substep 3-A. Determine the level, location, and type of management needed (prescriptions). Indirect management practices will be favored over direct management practices and will be as compatible as possible with the management environment developed in Step 2. Management needed includes:

1. Construct campground on west side of lake that is large enough to accommodate a concessionaire operation. A survey of local concessionaire operators indicates at least 100 campsites would be needed, though they would be interested in more. 100 campsites will serve the existing use volume and additional increases in use of the area assuming 5 people-at-one-time use/campsite x 100 = 500 campers. Therefore, construct a 100 campsite fee campground which provides potable water, garbage pickup, and the appropriate number of sanitary facilities. At least half the sites should be arranged for multi-family socialization.
2. Campground should be made to blend in with the local natural environment, using native materials where possible. Maintain the look of minimum regulation by using indigenous large rocks as borders along the roads to keep vehicles in the appropriate areas.

3. Have a differential fees structure, charging less during off peak periods to encourage use then (Martin, Clemson class notes, 1992). Market this opportunity through the local media and at the campground.
4. Where or when needed, enhance area's visual qualities through vegetative management practices such as thinning, pruning, or planting.
5. Encourage campers in the designated dispersed areas to use low impact techniques. Enforce camping at the designated dispersed sites.
6. Minimize campsite and trail erosion into lake by using the appropriate hardening procedures.
7. Protect and maintain area's ground cover and wildlife hiding cover.
8. Use available vegetation to maximize shading of campsites in both the campground and the designated dispersed area.
9. Design the campsites and campsite loops with the appropriate amount of distance between the sites.
10. Develop an Information and Education Program which stresses communicating information about items which the public who use this lake have identified as important to them, such as the history of the area. Also use this program to inform the public about the destructive consequences of deprecative behavior.
11. On the south side of the lake place 5 designated dispersed sites, construct 1 vault toilet (2 seater), and build small parking lot for day visitors wanting access to the head of the lake. On the road leading into this area place 15 designated dispersed sites.
12. On the east side of the lake place 10 designated dispersed sites and construct 1 vault toilet (2 seater). On the road leading into this area place 15 designated dispersed sites.
13. Provide several designated dispersed sites for campers who bring livestock. Place these sites near the stock tank north of the lake. Market this opportunity.
14. Advertise underused areas in the RLMA and on the Mogollon Rim and the recreation opportunities they provide.

9.4 Step 4. Monitor and evaluate success. Involves measuring the degree to which management objectives have been attained and evaluating future management needs. How well have the management objectives for the Bear Canyon Lake area satisfied the recreation motivations for which they were designed?

9.4.1 Substep 4-A. Monitor area conditions. Involves periodic measurement of area conditions, focusing on the conditions identified in the management objectives. This will be done using formal and informal survey techniques.

9.4.2 Substep 4-B. Evaluate area conditions. Compare area conditions to those specified in management objectives, determine success or if changes are needed. Management objectives were determined on the basis of motivations, attitudes, and preferences of selected visitor groups, so attainment of the conditions specified in the management objectives should result in visitor satisfaction (Step 3). If visitors are not satisfied, continue surveys and adjust the area's management objectives as deemed appropriate.

10.0 SUMMARY

The Bear Canyon Lake area is a significant recreation resource in the RLMA enjoyed by many Arizonans. It provides a unique experience prized by a growing number of the public. This study defined and planned for several desirable experience opportunities in this setting using a modified LAC framework. This framework provides an objective process to evaluate alternative management concepts and gain public feedback throughout the process.

Management Concepts 2 and 3 are both viable options which protect or enhance the social and physical setting at the lake area. Concept 3 was selected because it provides a range of social opportunities, and the management benefits of concessionaire operation, at this heavily used recreation location.

APPENDIX A

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APPENDIX B.

Selected responses which show the range of comments to Bear Canyon Lake Campground Environmental Analysis information package.

--"more designated dispersed camping"
--"keep in present condition"
--want "diversity in recreation opportunities"
--"I appreciate the quiet undisturbed setting of the lake"
--"develop campground to keep pressure off other lakes"
--"don't destroy scenic attractiveness of area"
--want "semi-primitive setting-quiet"
--"develop like Canyon Point pre new construction"
--"maintain pristine feel"
--"Develop campground where people want to camp"
--"leave as is"
--"want privacy-quiet"
--"primitive"
--"provide additional developed opportunities to handle crowds"
--"shudder to see Bear Canyon too developed"
--"a campground seems like a good idea"
--"develop to the max"
--"Why impact a pristine area?
--"develop campground to concentrate use to minimize area impacted by heavy use"
--"smell isn't very pleasant", person talking about human waste in area.
--"control camping, bring recreation area back to it's original form"
--"retain as primitive lake"
--"campground that is not too developed and campsites not too crowded together."

APPENDIX C.

This study adheres to, and has integrated into it, Manning's 10 basic principles of outdoor recreation management (1985). These principles are defined verbatim below:

Principle 1. Consider outdoor recreation management within a three-fold framework of concerns: the natural environment, the social environment, and the management environment. This three-fold organizational framework is a useful way to consider and analyze outdoor recreation issues in a comprehensive, multidisciplinary fashion.

Principle 2. Public tastes for outdoor recreation are diverse. This is true in regard to activities engaged in, attitudes and preferences about management policy, desired use density or contact levels, and motivations for outdoor recreation. Simple averages or majority opinions often used to report or summarize outdoor recreation tend to obscure this diversity.

Principle 3. Diversity is needed in outdoor recreation opportunities. The natural, social, and management environments that define outdoor recreation opportunities should be combined in a variety of alternative arrangements to produce diversity in the total outdoor recreation system.

Principle 4. Explicit objectives are needed to guide management of outdoor recreation. Objectives should be formulated on the basis of resource, social, and management factors.

Principle 5. Visitor satisfaction with outdoor recreation areas is a multifaceted concept. Visitors are perceptive of and sensitive to many aspects of the natural, social, and management environments that comprise outdoor recreation areas.

Principle 6. Fulfilling motivations is a more appropriate definition of outdoor recreation than is participation in activities. Though participation in activities is the outward manifestation of outdoor recreation, it is motivations for selected values, rewards, or satisfactions that ultimately drive participation. Consideration of motivations in outdoor recreation management leads to a more fundamental understanding of visitors and their satisfaction.

Principle 7. Quality outdoor recreation results when opportunities satisfy the motivations for which they are designed. The correspondence between tastes and opportunities is the most appropriate criterion for determining quality in outdoor recreation. Many types of outdoor recreation opportunities exist and each can and should be of high quality. <u>High quality exists when outdoor recreation opportunities meet the needs of visitors.</u>

Principle 8. Obtain systematic and objective information about and from visitors. Research indicates that managers' perceptions of the visitors to outdoor recreation areas often differ from reality. Objective and systematically collected information is needed about what affects satisfaction.

Principle 9. Manage outdoor recreation opportunities for relatively homogeneous groups of visitors. Research suggests that motivations for recreation and attitudes, preferences, and perceptions of the total recreation environment are related within groups of visitors. Combinations of environmental, social, and managerial conditions should be designed to be compatible in view of these relationships. In this way, recreation opportunities will be managed for selected market segments of the visitor population. This helps insure that visitors attracted to the same areas share similar values, and perceptions of alikeness among visitors will tend to be enhanced, thus potentially increasing the social capacity of the areas.

Principle 10. A variety of practices is available for managing outdoor recreation. Indirect management practices should be favored over direct practices where they can be effective. Management practices should be determined through a systematic, well-documented process which is subject to public participation and review.